Remarks

In the final Office Action, Claims 1-8 and 17-19 were again rejected under 35 U.S.C. Section 103(b) as being unpatentable over U.S. Patent No. 5,621,596 to Santini in view of U.S. Patent No. 6,150,046 to Watanabe et al.

By this Amendment, Applicants have amended the independent Claims 1, 5 and 17 to further point out and distinctly claim the subject invention. In particular, additional limitations have been claimed to further define the nature of the insulation shell layer. Specifically, the insulation shell layer has been recited to be formed on the entire photoresist insulation layer. Further, the claims have been amended to include the concept that the insulation shell layer conforms to the contours of the photoresist insulation layer with the top pole having an apex angle which is substantially defined by the photoresist insulation layer.

Applicants respectfully submit that such amended language does not introduce any new matter. The insulation shell layer being formed on the entire photoresist insulation layer is amply supported by the Specification (page 8, lines 1-3, Figures 5-6). The insulation shell layer conforming to the contours of the photoresist insulation layer with the top pole having an apex angle which is substantially defined by the photoresist insulation layer is also amply supported by the Specification (page 7, line 15 to page 8, lines 3, Figures 4-6).

These distinctions are not trivial. The impact of the insulation shell layer being formed on the entire photoresist insulation layer that conforms to the contours of the photoresist insulation layer with the top pole having an apex angle which is substantially

defined by the photoresist insulation layer has substantial benefits over prior art configurations and in particular the cited art.

As discussed in the Specification, the utilization of the recited insulation shell layer upon the photoresist insulation layer has advantages over that of a bare photoresist insulation layer, such as formed of cured photoresist. (see page 8, line 3 to page 10, line 10). Among the advantages of utilizing the insulation shell layer of dielectric material include improved adhesion of magnetic films to the insulation shell layer, improved grain growth of pole seed layers, decreased differential in thermal mechanical properties between the insulation shell layer and the magnetic film layers, and preservation of the desirable magnetic anisotropy properties of high moment magnetic films during fabrication.

Stated otherwise, in comparison to the design of the present invention, application of a top pole (P2) which is considered to be of a relatively high magnetic moment layer upon a cured photoresist presents several problems. Generally, cured photoresist does not promote growth of magnetic material due to such characteristics as grain density and texture. The insulation shell layer acts to isolate the high magnetic moment film (P2) from the cured photoresist. The insulation shell layer formed of the dielectric material offers a comparatively desirable surface for growing a seed layer to facilitate the formation of a top pole having relatively improved magnetic properties.

Further, there are difficulties in attempting to apply the top pole onto a sloped surface of the cured photoresist. In this regard, the cured photoresist tends to form a natural slope towards the air bearing surface (ABS) that defines the zero-slope where the top and bottom poles tend to diverge. This angle is referred to as the apex angle.

By utilizing the insulation shell layer formed of a dielectric material, the insulation shell layer may be formed through various deposition processes, such as Physical Vapor Deposition (PVD), Chemical Vapor Deposition (CVD), Low Pressure Chemical Vapor Deposition (LPCVD) and Atomic Layer Chemical Vapor Deposition (ALCVD). It is understood that this facilitates the insulation shell layer being formed across the entire photoresist insulation layer. Further, it is understood that such processes tend to result in an insulation shell layer that has a uniform thickness. Thus, the insulation shell layer tends to conform to the contour of the underlying photoresist insulation layer, including the sloping portion of the photoresist insulation layer adjacent the air bearing surface (ABS). As such, a top pole formed upon the resulting insulation shell layer will have an apex angle substantially defined by the photoresist insulation layer.

Reproduced below are Figures 5 and 6 of the present application.

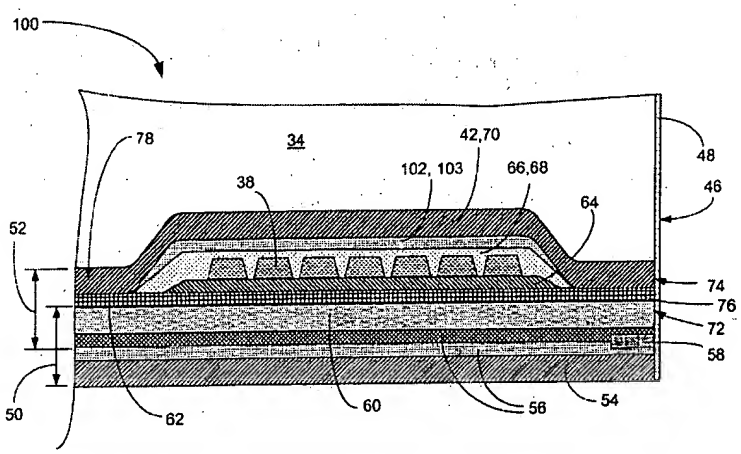

FIGURE 5

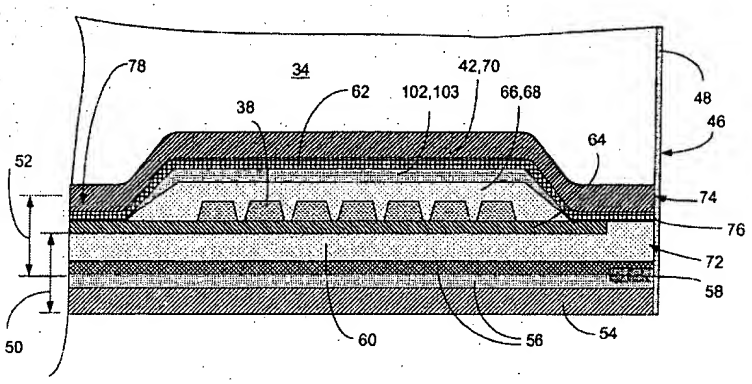

FIGURE 6

As illustrated by both of these embodiments, there is a second insulation layer (I2) 66 which is formed of photoresist 68 (i.e., the recited "photoresist insulation layer"). An insulation shell layer 102 (i.e., the recited "insulation shell layer") which is formed of a dielectric material 103 is disposed across the entire insulation layer 66 including the sloped portion disposed towards an air bearing surface (ABS) 46 (this is at the right hand side). The insulation shell layer 102 conforms to the contours of the photoresist 68. As such, a top pole or second pole layer (P2) 70 (i.e., the recited "top pole") is formed upon the resulting insulation shell layer 102 and has an apex angle substantially defined by the underlying second insulation layer (I2) 66.

In contrast, reproduced below are Figures 8 and 9 of the Santini reference illustrating two of the embodiments of the disclosed head design. It is noted that compared to Figures 5 and 6 of the Application, in Figures 8 and 9 of the Santini reference the air bearing surface is shown at the left hand side.

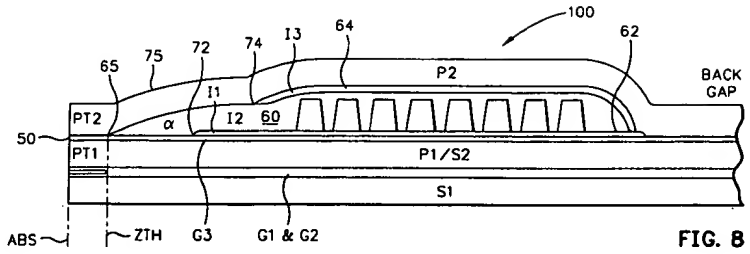

FIG. 8

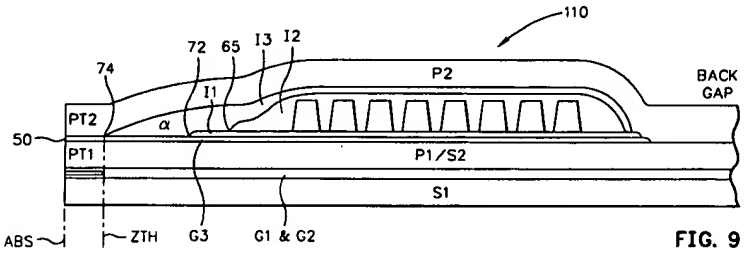

FIG. 9

The embodiment shown in Figure 8 shows a second insulation layer 60 (I2) which is formed of photoresist. A third insulation layer 64 (I3) is disposed upon the second insulation layer 60. The third insulation layer 64 only partially covers the second insulation layer 60, leaving a sloping portion of the second insulation layer 60 adjacent the air bearing surface (ABS) to be exposed. A second pole (P2) is formed upon both the exposed portion of the second insulation layer 60 and the third insulation layer 64.

This design clearly deviates from the claimed invention. The third insulation layer 64 is not disposed across the entire second insulation layer 60. The portion of the second pole (P2) deposited upon the exposed portion of the second insulation layer 64 would be expected to have comparatively less desirable magnetic properties. This is because the photoresist that forms the second insulation layer does not promote the growth of the second pole (P2) having relatively good magnetic properties.

The embodiment shown in Figure 9 of the Santini reference shows a second insulation layer (I2) which is entirely covered by a third insulation layer (I3). A second

pole (P2) is disposed upon the third insulation layer (I3). The second pole (P2) is characterized as having an apex 74. The apex 74 is solely defined by the third insulation layer (I3). This is in contrast to the claimed invention where the apex angle is substantially defined by the photoresist insulation layer. In the design shown in Figure 9, the apex 74 is defined independent of the second insulation layer (I2) and is solely defined by the third insulation layer (I3) and is therefore distinguishable from the claimed invention.

In view of foregoing, Applicants respectfully submit that the cited art references do not teach or suggest the claimed invention as represented by the amended claims. Reconsideration of the applicability of such cited art is requested. Applicants therefore submit that all the stated grounds of rejection have been overcome, and all of the pending claims are in condition for allowance.

Should the Examiner have any suggestions for expediting allowance of the application, the Examiner is invited to contact Applicants' representative at the telephone number listed below. Should any additional fees be due please charge Deposit Account No. 19-4330.

Respectfully submitted,
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